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IS 12261 (1987): Method for reverse torsion test for
metallic wire [MTD 3: Mechanical Testing of Metals]

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Indian Standard

**METHOD FOR REVERSE TORSION TEST
FOR METALLIC WIRE**

1. Scope — This standard specifies the method for determining the ability of metallic wire of diameter 0.3 to 10 mm inclusive to undergo plastic deformation during reverse torsion. This test is used for detection of surface and internal defects of wire.

2. Principle — The test consists of twisting a test piece of wire for prescribed number of times through 360° around its own axis in one direction and the same number of times through 360° in the opposite direction.

3. Symbol, Designation and Unit — The symbol, designation and unit used in the reverse torsion test of wire are specified in Table 1.

TABLE 1 SYMBOL, DESIGNATION AND UNIT

Symbol	Designation	Unit
<i>d</i>	Diameter of round wire	mm
<i>L</i>	Free length between grip	mm
<i>N_t</i>	Number of turns in one direction	—

4. Testing Equipment

4.1 The grips shall be of sufficient hardness (to provide rigidity and/or resistance to abrasion). The grips shall be arranged in the testing machine in such a way that during testing, they remain on the same axis and do not apply any bending force to the test piece.

4.2 The machine shall be constructed so that a change of length between the grips, caused by the test piece during the test, is not prevented.

4.3 One of the grips shall be capable of being rotated around the axis of the test piece while the other shall not be subject to any angular deflection except for such deflection as may be necessary to measure the torque.

4.4 The distance between the grips shall be capable of adjustment for different test lengths.

4.5 The machine shall be constructed so that an appropriate tensile stress (see 6.2) may be applied to the test piece.

5. Test Piece

5.1 The length of wire to be used as the test piece shall be as straight as possible.

5.2 Variant A — Unless otherwise specified, the nominal free length between the grips, *L*, of the machine shall be as given in Table 2.

TABLE 2 NOMINAL FREE LENGTH BETWEEN GRIPS

Nominal Diameter <i>d</i> mm	Nominal Free Length Between Grips <i>L</i> mm
$0.3 \leq d < 1$	$200 d$
$1 \leq d < 5$	$100 d^*$
$5 \leq d \leq 10$	$50 d^{\dagger}$

* $50 d$ may be used by special agreement when the machine will not permit the use of a length equal to $100 d$.

† $30 d$ may be used by special agreement when the machine will not permit the use of a length equal to $50 d$.

5.3 Variant B — Unless otherwise specified, the nominal free length between the grips of the machine shall be 150 mm for all diameters of wires.

6. Procedure

6.1 In general, the test is carried out at ambient temperature between 10 and 35°C. Tests carried out under controlled conditions shall be conducted at a temperature of $23 \pm 5^\circ\text{C}$.

6.2 Place the test piece in the grips in such a way that its longitudinal axis coincides with the axis of the grips so that it remains straight during the test. Unless otherwise specified, this may be ensured by applying to the test piece, a constant tensile stress just sufficient to straighten it but not exceeding 2 percent of the value of the nominal tensile strength of the wire.

6.3 After placing the test piece in the machine, rotate one grip at a speed not exceeding 1 turn per second through the number of turns (N_t) specified in the relevant standard in one direction and the same number of turns in opposite direction. One turn comprises 360° .

6.4 Absence of defects detrimental to cold forming visible without the use of magnifying aids, is considered as an evidence that the test piece has passed the test unless otherwise specified in the relevant standard.

7. Test Report — The test report shall include at least the following information:

- a) Reference to this standard,
- b) Identification of the test piece,
- c) Number of turns (N_t), and
- d) Result of the test.

EXPLANATORY NOTE

In the preparation of this standard, assistance has been derived from draft proposal ISO/DP 9649 'Wire-Reverse torsion test', issued by the International Organization for Standardization (ISO).